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Benefits and Costs of Surface Water Quality Programs

Freshwater Wetland

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As part of the biennial water quality inventory States are required to provide an estimation of the benefits and costs of actions necessary to achieve the objectives of the Clean Water Act. The National Water Quality Inventory (EPA, 1998) indicates that none of the States reporting on their water quality programs have attempted to describe the full extent of the benefits and costs associated with implementing the Clean Water Act programs. There are two primary reasons for inadequate disclosure: (1) a lack of an analytical framework to present data and information on the benefits and costs of water quality programs, and (2) a lack of understanding about the concept of economic benefits.

Meaningful environmental regulation relies upon a comprehensive regulatory structure that can accurately assess issues and predict the need for necessary funds in advance of social requirements. Section 305(b) of the Clean Water Act calls for Texas to prepare estimates of the economic and social costs necessary to achieve the intent of the Act. The extent of the economic costs and benefits associated with water quality improvement is for the most part a local issue. For example, benefits are realized at the local level by the immediate improvement of the water in the locality which usually signifies increased recreational use of that water. There is currently no way to measure benefits of biodiversity or the value of the oxygen produced by a healthy ecosystem.

Values, Benefits, and Costs

Provided below is a framework for identifying, and systematically presenting, the benefits and costs of water quality programs. Available, cost data specific to Texas is presented. The framework used does not equate to a framework for justifying or negating water quality goals themselves, since such goals represent values. The approach used is based on the recognition that values are not benefits, or more specifically, that monetized economic benefits do not indicate values.

Most benefit-cost analyses and valuation techniques applied to environmental resources and programs mistakenly equate *value* with *benefit*. Such an analysis mistakenly leads to irrelevant considerations such as whether a particular environmental goal – such as clean air, or clean water, or preservation of open space - is a worthwhile goal. Environmental policy goals are expressions of public values and already have been justified through the public policy process that established them. Values or ethics cannot be quantified, or monetized. Values cannot be compared

to costs in the traditional sense of benefit-cost analysis. Economic benefit is not an indicator of value. Rather, economic benefit is merely the amount of income that individuals receive from using or accessing a resource. Economic benefit is only one of many benefits to be considered in developing public policy strategies for resource conservation.

Considerations of the benefits, and costs, of environmental programs can inform the public policy process in two ways by:

(1) emphasizing the consideration of minimizing compliance costs resulting from regulation, and

(2) helping policymakers to allocate scarce public investments.

Helping policymakers to allocate scarce public investments bears some discussion. In the public policy arena, resources devoted to achieving public policy goals are limited. And because those resources are limited, public policy decision-makers must make some judgments about how to best allocate resources between existing public policy goals. Benefit-cost analysis can be one tool for evaluating alternative choices in allocating and prioritizing the use of public funds, but it does not equate to justification or negation of the original goals.

Framework for Consideration of Economic and Social Benefits and Costs

The framework used here for considering benefits and costs of water quality protection and enhancement strategy is centered on *organizing* data that exists in different metrics (Kicker and Lynne, 1988). The framework avoids the difficult task of placing all benefits and costs into a common numerical measurement system such as dollars. The framework is a summary matrix that presents different types of information – biological, economic, social, and others.

Table 1 presents a summary of cost-benefit information available. Texas' current total economic income Gross State Product is also included for comparison to other economic data. Generally, there is not very much data regarding the economic benefits of protecting aquatic uses and other water quality characteristics. However, the framework developed for the year 2000 report can be further enhanced over time with additional data and studies so that more comprehensive information can be made available.

Texas' current State income is $695 billion. Some of this income is attributable to sport fishing activities which mean more than $6 billion annually. Other income data that would depend on meeting water quality standards are currently unavailable.

One entry that bears discussion is the estimate of lost recreational income due to water quality degradation – specifically, those water bodies that do not meet or only partially meet their water quality standards. The data presented -- $357 million lost annually (in 1987 dollars) -- represents a lower bound of the current estimate of lost income. This lower estimate was calculated in a 1995 study by Sokulsky and Amaya and is a function of the following factors:

- Total number of water bodies not meeting or only partially meeting water quality standards as of 1994. In 1994, 83 water bodies were placed on the 303(d) List of Impaired Waters. This number of water bodies with threatened or impaired designated beneficial uses have grown to 238 in year 2000.
- Estimated average number of people that may visit anyone given water body in Texas: 229,767 persons, according to a 1987 survey.
- Economic income derived from each visitor: $18.47 (day visit) to $21.29 (overnight visit), according to a 1987 survey.

Based on the data, the study estimated that the potential recreational income loss associated with water quality degradation to be about $357 million annually. If recalculated using more current data, the estimate of recreational income losses would be expected to be higher due to the increased number of water bodies identified with threatened or impaired uses, a larger Texas population, and growing incomes.

Currently about 70 percent of streams and rivers in Texas meet the federal water quality standards as noted in Table 117. One possible interpretation of these datum vis a vis the financial costs spent to date, is that since 1972 Texas has spent approximately $5.2 billion in public monies to provide the benefit that 70 percent of the streams and rivers meet standards. This $5.2 billion excludes state regulatory and non-point source program costs. Industrial private sector costs are not available but certainly contribute to meeting water quality standards. The estimated average annual investment – $289 million – is relatively small, representing only 1 percent of the State's Gross Product. That is, on an average annual basis only a very small amount of public money is invested in meeting water quality goals; hence, public investment in water quality protection does not appear to represent very high opportunity costs.

Table 117. The Framework for Considering Benefits and Costs of Texas Surface Water Quality Programs Pursuant to Section 305(b)(1)(D), Federal Clean Water Act

Economic Attribute	Benefits	Costs
Biological and Physical Attributes		
Percent of waters meeting/not meeting standards	63%	27%
Economic Attributes		
Estimated Annual Total Cost of TNRCC Clean Water Act Program Costs		$11,000,000
Estimated Municipal Capital Investment, 1972-2000		$5,200,000,000
Projected Average Municipal Capital Investment, 2000-2050		$25,000,000,000
Annual Average Municipal Capital Cost, 2001-2050		$500,000,000
Projected Annual Average Municipal Cost as percentage of Texas Gross State Product ($695 billion)		<1 %
Estimated Annual Sport Fishing Income (Expenditures)	$6,000,000,000	
Estimated Annual Commercial Fishing Income	Not Available	
Estimated Annual Income for Contact Recreation (e.g., swimming and wading)	Not Available	
Estimated Annual Income from Shoreline Activities (e.g., birdwatching, beach combing)	Not Available	
Estimated Annual State Sales Tax Revenue from Fishing Expenditures	$179,000,000	
Estimated Minimum Lost Recreation Income due to Waters Not Meeting Water Quality Standards	$357,000,000 (1987 dollars)	
Social Attributes		
Number of Fish Consumption Advisories and Aquatic Life Closures		14

Notes to Table:
(1) NA=not available;
(2) Source for Est. Municipal Capital (Facility) Investment is Texas Water Development Board Database. Sources for Projected Municipal Capital (Facility) Investments, 2001-2050 is the Board's 1997 Water for Texas, in 1996 dollars;
(3) Sources for Estimated Annual Sport Fishing Income is Texas Parks and Wildlife Department's "Recreation & Economics" at: www.tpwd.state.tx.us/texasw...m/econsportfish/econsportfish.html). 1996 dollars; and
(4) Sources for Estimated Annual State Sales Tax Revenues from Fishing Expenditures (1996 dollars) is Texas Parks and Wildlife Department's "Recreation and Economics."(http://www.tpwd.state.tx.us/ texasw...m/econsportfish/econsportfish.html).

The economic benefit of clean water outweighs the investment of businesses for the construction of new facilities in the eyes of the public. Consequently, the need for more data on private sector investments is a major planning issue. As indicated in Table 117, current average annual income for Sport Fishing is at least $6 billion, compared to an average annual projected capital investment of $500 million. While there are limitations in this approach the data, presented does outline some information about the economic role of clean water.

Additionally, Table 117 identifies other important attributes associated with clean water. Case studies included instances where expenditures resulted in increased water-based recreational activities, and improvement in commercial and sports fisheries, recovered damaged aquatic environments, reduced costs of water treatment and reduced medical costs due to improved water quality for recreation. Texas routinely discusses the costs and benefits of water quality achievements for programs and specific documented sites. In the future, more extensive documentation, especially addressing wastewater problems, will improve the needs' estimation for a broader range of programs and projects. Texas will encourage solutions that figure in drought and flood conditions as they relate to wastewater treatment facilities to be constructed.

A summary of known existing studies, specific to Texas, regarding the economic and social benefits and goals of water quality protection and/or degradation is listed in Table 118. This list is intended to grow and serve as a reference as appropriate for informing policy issues regarding implementing of the CWA.

Table 118. Inventory of Texas Specific Studies Regarding Economic and Social Benefits and Costs of Implementing Water Quality Programs

Date	Title	Comments
1988	The 1987 Annual Economic Impact of Texas State Park Visitors on Gross Business Receipts in Dollars. Texas Parks and Wildlife Department. Austin, Texas. 1988.	
1994	The Economic Value Improving The Environmental Quality of Galveston Bay, Galveston Bay National Estuary Program, GBNEP-38, June 1994.	
1995	"An Estimation of the Economic Impacts of Surface Water Quality Degradation." Presented at Water For Texas, January 1995.	Estimates the loss of recreational income due to impaired water bodies to be $357 million annually (in 1987 dollars).
1997	Texas Natural Resources Conservation Commission. *State of Texas Environmental Priorities Project. Volume 4; Socioeconomic Workgroup Report*. C.F.-04. Austin, Texas. June 1997.	Includes chapter on socioeconomic issues associated with surface water quality protection and degradation.
2000	Texas Natural Resources Conservation Commission. *Strategic Plan. Volume 1: Fiscal Years 2001-2005.* SFR-035A/00. Austin, Texas. June 2000	Includes section on funding of the TNRCC and how revenue is spent
2000	Texas Natural Resources Conservation Commission. *Strategic Plan. State of the Texas Environment. Volume 2: Fiscal Years 2001-2005.* SFR-035B/00. Austin, Texas. June 2000	Section 3: Surface Water Quality Section 4: Groundwater Quality Section 5: Drinking Water Quality Section 6: Water Supply